Interaction between DRD2 and lead exposure on the cortical thickness of the frontal lobe in youth with attention-deficit/hyperactivity disorder.


Abstract

BACKGROUND:
The dopamine receptor D2 receptor (DRD2) gene and lead exposure are both thought to contribute to the pathophysiology of attention-deficit/hyperactivity disorder (ADHD). ADHD is characterized by delay in brain maturation, most prominent in the prefrontal cortex (PFC). The D2 receptor is also mainly located in the PFC, and animal studies show that lead exposure affects the dopaminergic system of the frontal lobe, indicating an overlap in neural correlates of ADHD, DRD2, and lead exposure. We examined the interaction effects of DRD2 rs1800497 and lead exposure on the cortical thickness of the frontal lobe in patients with ADHD.

METHODS:
A 1:1 age- and gender-matched sample of 75 participants with ADHD and 75 healthy participants was included in the analysis. The interaction effects of DRD2 and lead exposure on the cortical thickness of 12 regions of interest in the frontal lobe were examined by multivariable linear regression analyses.

RESULTS:
When we investigated the DRD2×lead effects in the ADHD and HC groups separately, significant DRD2×lead effects were found in the ADHD group, but not in the healthy control group in multiple ROIs of the frontal lobe. There was a significant negative correlation between the cortical thickness of the right superior frontal gyrus and inattention scores.

CONCLUSIONS:
The present findings demonstrated significant interaction effects of DRD2 and lead exposure on the cortical thickness of the frontal lobe in ADHD. Replication studies with larger sample sizes, using a prospective design, are warranted to confirm these findings.